

**Notice of Allowability**

Application No.

10/672,094

Examiner

Craig A. Renner

Applicant(s)

LILLE, JEFFREY S.

Art Unit

2627

**-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address--**

All claims being allowable, PROSECUTION ON THE MERITS IS (OR REMAINS) CLOSED in this application. If not included herewith (or previously mailed), a Notice of Allowance (PTOL-85) or other appropriate communication will be mailed in due course. **THIS NOTICE OF ALLOWABILITY IS NOT A GRANT OF PATENT RIGHTS.** This application is subject to withdrawal from issue at the initiative of the Office or upon petition by the applicant. See 37 CFR 1.313 and MPEP 1308.

1. ☒ This communication is responsive to paper(s) filed 28 September 2006.
2. ☒ The allowed claim(s) is/are 1,3-12,14-20 and 32 (renumbered 1-19, respectively).
3. ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some\* c) ☐ None of the:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this national stage application from the International Bureau (PCT Rule 17.2(a)).

\* Certified copies not received: \_\_\_\_\_.

Applicant has THREE MONTHS FROM THE "MAILING DATE" of this communication to file a reply complying with the requirements noted below. Failure to timely comply will result in ABANDONMENT of this application.

**THIS THREE-MONTH PERIOD IS NOT EXTENDABLE.**

4. ☐ A SUBSTITUTE OATH OR DECLARATION must be submitted. Note the attached EXAMINER'S AMENDMENT or NOTICE OF INFORMAL PATENT APPLICATION (PTO-152) which gives reason(s) why the oath or declaration is deficient.
5. ☐ CORRECTED DRAWINGS (as "replacement sheets") must be submitted.
- (a) ☐ including changes required by the Notice of Draftsperson's Patent Drawing Review (PTO-948) attached
- 1) ☐ hereto or 2) ☐ to Paper No./Mail Date \_\_\_\_\_.
- (b) ☐ including changes required by the attached Examiner's Amendment / Comment or in the Office action of Paper No./Mail Date \_\_\_\_\_.
- Identifying indicia such as the application number (see 37 CFR 1.84(c)) should be written on the drawings in the front (not the back) of each sheet. Replacement sheet(s) should be labeled as such in the header according to 37 CFR 1.121(d).
6. ☐ DEPOSIT OF and/or INFORMATION about the deposit of BIOLOGICAL MATERIAL must be submitted. Note the attached Examiner's comment regarding REQUIREMENT FOR THE DEPOSIT OF BIOLOGICAL MATERIAL.

**Attachment(s)**

- |  |   |
|--|---|
| 1. <input type="checkbox"/> Notice of References Cited (PTO-892)   | 5. <input type="checkbox"/> Notice of Informal Patent Application                                 |
| 2. <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)                       | 6. <input checked="" type="checkbox"/> Interview Summary (PTO-413),<br>Paper No./Mail Date _____. |
| 3. <input type="checkbox"/> Information Disclosure Statements (PTO/SB/08),<br>Paper No./Mail Date _____    | 7. <input checked="" type="checkbox"/> Examiner's Amendment/Comment                               |
| 4. <input type="checkbox"/> Examiner's Comment Regarding Requirement for Deposit<br>of Biological Material | 8. <input type="checkbox"/> Examiner's Statement of Reasons for Allowance                         |
|  | 9. <input type="checkbox"/> Other _____.  |

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1. The drawings were received on 28 September 2006. These drawings are accepted.
2. An examiner's amendment to the record appears below. Should the changes and/or additions be unacceptable to applicant, an amendment may be filed as provided by 37 CFR 1.312. To ensure consideration of such an amendment, it MUST be submitted no later than the payment of the issue fee.

Authorization for this examiner's amendment was given in a telephone interview with Ronald B. Feece on 27 November 2006.

3. The application has been amended as follows:

IN THE TITLE:

The title has been amended to read as follows:

--PERPENDICULAR MAGNETIC RECORDING HEAD WITH TRAILING SHIELD  
THROAT HEIGHT LESS THAN SHAPING LAYER DISTANCE FROM ABS--.

IN THE CLAIMS:

The claim listing has been amended to read as follows:

1. (Previously Presented) A magnetic head having an air bearing surface (ABS), comprising:  
a writing pole, comprising:  
a pole tip for writing data to magnetic media via lines of flux emitted from  
an ABS end of the writing pole;  
a shaping layer coupled to the pole tip, the shaping layer being for  
focusing flux to the pole tip;  
a trailing shield spaced apart from the writing pole, the trailing shield causing the  
lines of flux to enter the media at an angle from a plane perpendicular to a  
surface of the media facing the writing pole; and  
a non-magnetic mask layer co-planar to the trailing shield which defines the  
height of the trailing shield;  
wherein a throat height of the trailing shield is less than a distance from the ABS  
end of the writing pole to the shaping layer.
2. (Cancelled).
3. (Original) A magnetic head as recited in claim 1, wherein a ratio of a distance  
between the pole tip and the trailing shield, and a distance between the ABS end  
of the pole tip and a writeable layer of the media, is between about 2:1 and about  
1:2.

4. (Original) A magnetic head as recited in claim 1, wherein a distance between the pole tip and the trailing shield is less than about 50 nm.
5. (Original) A magnetic head as recited in claim 1, wherein the trailing shield is not magnetically continuous to a back gap of the magnetic head.
6. (Previously Presented) A magnetic head as recited in claim 1, wherein the trailing shield is magnetically connected with a return pole of the magnetic head.
7. (Original) A magnetic head as recited in claim 1, further comprising a return pole, the trailing shield being positioned between the writing pole and the return pole.
8. (Original) A magnetic head as recited in claim 7, wherein the return pole is stitched to the trailing shield at a position recessed from the ABS.
9. (Original) A magnetic head as recited in claim 1, wherein the head is a perpendicular head.
10. (Currently Amended) A magnetic head as recited in claim 1, wherein the trailing shield is positioned adjacent a mask material, the mask material defining [[a]] the throat height of the trailing shield.

11. (Original) A magnetic head as recited in claim 10, wherein a height of the mask material is greater than a distance from the trailing shield to the ABS.
12. (Previously Presented) A magnetic head structure for perpendicular recording and reading, the magnetic head structure having an air bearing surface (ABS), comprising:  
a write head portion for writing data to magnetic media, the write head portion including:
  - a first pole piece;
  - a probe pole piece, the probe pole piece having a probe pole tip for emitting magnetic flux from an ABS end thereof;
  - an insulation stack positioned between the pole pieces;
  - at least one write coil embedded in the insulation stack;
  - a shaping layer positioned between the probe pole piece and the first pole piece, the shaping layer being for focusing flux to the probe pole tip; and
  - a trailing shield spaced apart from the probe pole piece, the trailing shield causing the magnetic flux to enter the media at an angle from a plane perpendicular to a surface of the media facing the probe pole tip; anda non-magnetic mask layer which is coplanar to the trailing shield;

wherein a throat height of the trailing shield is less than a distance from the ABS end of the probe pole tip to the shaping layer.

13. (Cancelled).
14. (Original) A magnetic head structure as recited in claim 12, wherein a ratio of a distance between the probe pole tip and the trailing shield, and a distance between the ABS end of the probe pole tip and a writeable layer of the media, is between about 2:1 and about 1:2.
15. (Original) A magnetic head structure as recited in claim 12, wherein a distance between the probe pole tip and the trailing shield is less than about 50 nm.
16. (Previously Presented) A magnetic head structure as recited in claim 12, wherein the trailing shield is not magnetically continuous to a back gap of the magnetic head structure.
17. (Original) A magnetic head structure as recited in claim 12, wherein the trailing shield is magnetically connected with a return pole of the magnetic head structure.
18. (Currently Amended) A magnetic head structure as recited in claim 12, wherein

a ~~the~~ return pole piece is stitched to the trailing shield at a position recessed from the ABS.

19. (Currently Amended) A magnetic head structure as recited in claim 12, wherein the trailing shield is positioned adjacent a mask material, the mask material defining ~~[[a]]~~ the throat height of the trailing shield.

20. (Original) A magnetic head structure as recited in claim 19, wherein a height of the mask material is greater than a distance from the trailing shield to the ABS.

21-31. (Cancelled).

32. (Currently Amended) A magnetic storage system, comprising:  
magnetic media;  
at least one head for reading from and writing to the magnetic media, each head having:  
a write head portion for writing data to the media ~~medium~~ via lines of flux oriented substantially perpendicular to a surface of the media facing the write head portion, the write head portion including:  
a pole tip for writing data to the magnetic media via lines of flux emitted from an ABS end of the pole tip;  
a shaping layer coupled to the pole tip, the shaping layer

being for focusing flux to the pole tip; and

a trailing shield spaced apart from the pole tip, the trailing shield causing the lines of flux to enter the media at an angle from a plane perpendicular to a surface of the media facing the pole tip;

wherein a throat height of the trailing shield is less than a distance from the ABS end of the pole tip to the shaping layer;

a non-magnetic mask layer which is coplanar to the trailing ~~shield~~ shield;

a slider for supporting the head; and


a control unit coupled to the head for controlling operation of the head.



4. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Craig A. Renner whose telephone number is (571) 272-7580. The examiner can normally be reached on Monday-Tuesday & Thursday-Friday 9:00 AM - 7:30 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Hoa T. Nguyen can be reached on (571) 272-7579. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.



Craig A. Renner  
Primary Examiner  
Art Unit 2627

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